

REMARKS

The Official Action of December 15, 2004, and the prior art relied upon therein have been carefully reviewed. The claims in the application are now claims 1-3, and these claims define patentable subject matter warranting their allowance. The applicants therefore respectfully request favorable reconsideration and allowance.

Acknowledgement by the PTO of the receipt of applicants' papers filed under Section 119 is noted.

Claim 1 has been objected to because of the presence of minor informalities; and claim 1 has also been rejected under the second paragraph of §112. The rejection is respectfully traversed.

The applicants believe that claim 1 as previously drafted, particularly considered in light of applicants' specification (fully consistent with the law), would not have been confusing to those skilled in the art, and therefore claim 1 in its previous form is fully in accordance with §112. At **worst**, claim 1 in its previous form might be considered objectionable (it was objected to), but **only** as to form, requiring no substantial amendment relating to patentability.

Nevertheless, in deference to the examiner's views and to avoid or minimize needless argument, a number of

cosmetic amendments have been made in claim 1, e.g. the word "mild" has been deleted (although this term would be well understood by those skilled in the art), and the claim has been restructured. The amendments are of a formal nature only, i.e. made to place the claims in improved form for U.S. practice, or the examiner's understanding of what is desirable under U.S. practice.

The amendments are not "narrowing" amendments, because the scope of the claims has not been reduced¹. No limitations have been added and none are intended.

As regards the word "long", this term is defined not only in applicants' specification but also in lines 8 and 9 of claim 1 in its original form as being of "a size of 0.2-20 µm or greater". Moreover, the very same terminology was permitted in applicants' parent application, now U.S. patent 6,841,142, where the word "long" appears in claim 1.

Withdrawal of the rejection is in order and is respectfully requested.

Claims 1 and 2 have been rejected as obvious under §103 from the publication of Dai et al (Dai) in view of

¹ Claim 1 has been broadened with respect to the tip which can be made of a variety of materials and need not be Si, support being found in the second paragraph above example 1 (page 12) where it is stated that "The transition metal chalcogenide nanotubes of the invention can be used for the preparation of tips for scanning probe microscopy by methods well-known in the art such as the procedure of Dai et al." Claim 3 has been added to specify that the tip is a Si tip.

Homyonfer et al WO 98/23796 (Homyonfer). This rejection is respectfully traversed.

First, claim 1 has been restructured to make more clear that the method involves five (5) steps or operations. Even though such five steps or operations were previously claimed, the original structure of the claim 1 may not have made that sufficiently clear. Applicants believe that even if the proposed combination were obvious, it would not reach applicants' method.

Moreover, the results of the references and consequently the results of any combination of the applied references are and would be quite different from the results of the present invention, particularly insofar as the resultant product is concerned. Thus, Dai describes a tip for scanning probe microscopy (SPM) made of an individual carbon nanotube glued to a Si₃N₄ cantilever. This tip is quite sharp (diameter<10 nm) and therefore is very flexible. This means that thermal fluctuations would lead to rattling of the tube, making the image quite fuzzy. This is particularly important when the imaged surface is not even or regular. If for example the surface contains deep holes or grooves, like vias which have to be imaged, the nanotube which goes down along the topography of the via's wall will eventually snap and

become glued to the wall. In this case either the image will be disturbed or in the worst case the tip will be damaged.

The WS₂ long nanotubes made according to the present invention have three (S-W-S) strongly bonded atomic layers and are somewhat thicker in diameter than the tip described in Dai and are appreciably stiffer. This means that the tip resulting from the invention having a length similar to that of Dai is less flexible and will not rattle on the imaged surface nor it will snap to the via's wall, providing thereby much more reliable means to probe the surface of deep holes and surface irregularities. For example, in the article of Seifert et al. (Seifert et al, *Phys. Rev. Lett.*, 85, 146, 2000) it was shown that the strain (elastic), copy attached, energy of the MoS₂ (WS₂) nanotube is 10 times larger than that of carbon nanotube with equal diameter and hence MoS₂ (WS₂) nanotubes are much stiffer and they do not easily snap and glue to the deep walls of the vias or holes in general.

Furthermore, the tips used in the present invention differ from those prepared in Homyonfer and consequently, using a combination of Dai and Homyonfer would provide tips for SPM different than those prepared in the present invention. This is so because the tips prepared in the present invention are longer than those in Homyonfer and have the required aspect

ratio (length to width ratio) that is especially advantageous when imaging uneven surfaces such as vias or holes.

In addition, in the present invention the tips are prepared within the scanning electron microscope, while in Homyonfer they were prepared under optical microscopy. Given the fact that optical microscopy is limited to magnifications of 500 to 800 the accuracy of the prepared tips in Homyonfer is not large (they must be very straight or otherwise they will give false data). The rate of success in the present invention is about 1:2 and even better, because the magnification of the SEM is at least 100 times larger.

Withdrawal of the rejection is in order and is respectfully requested.

Applicants believe that all issues raised in the Office Action have been addressed and resolved in favor of patentability. Accordingly, the applicants respectfully request favorable reconsideration and allowance.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.
Attorneys for Applicant(s)

By



Sheridan Neimark

Registration No. 20,520

SN:jaa:jec
Telephone No.: (202) 628-5197
Facsimile No.: (202) 737-3528
G:\bn\c\cohn\tenne3a\pto\Amd 15mr05.doc